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## STEWART'S DISEASE IN RELATION TO WINTER TEMPERATURES

N. E. Stevens

The outstanding disease phenomenon among cultivated plants during the past few years is undoubtedly the destruction caused by bacterial wilt of corn, often called Stewart's disease (Aplanobacter stewarti), which reached a climax in 1932 and 1933. This disease has been known for many years and is widely distributed in the central and east-central portions of the United States. In the years indicated above the disease was very abundant not only within its usual range but over a large area farther north, where susceptible varieties of sweet corn had long been grown successfully. The unprecedented losses of 1932 and 1933 were followed by a sudden drop to something like normal incidence and range of the disease in 1934.

Obviously, to produce such an epidemic or, for that matter, to produce a parasitic disease in any degree, it is necessary that two, perhaps different, classes of environmental conditions be satisfied - those which make possible the presence of the parasite in adequate numbers and those which make possible the development of the disease or the expression of the disease in the host. There are reasons for believing that the conditions here considered fall in the first category.

The most striking environmental phenomena of the period in this region were the extraordinarily warm winters preceding the growing seasons of 1932 and 1933 and, in the Northeast, the unparalleled severity of the winter months preceding the growing season of 1934. The following notes are concerned with the apparent relation between the range and incidence of the disease and this obvious environmental condition. No claim to originality can be made in suggesting such a relation. The association of the warm winters with the great outbreak of bacterial wilt has been the subject of frequent comment when the recent epidemic has been under discussion.

## Range of the Disease Prior to the Last Outbreak

As is almost always the case, even with well-known diseases, the records of occurrence are fragmentary. However, from published notes, from the files of the Plant Disease Survey, and the results of Rand's careful field work from 1921 to 1924, it is possible to reconstruct a fairly satisfactory picture of the behavior of the disease during the past 35 years.

It was present on Long Island, New York, in 1895, when F. C. Stewart began his work there, and persisted there during the three years of his work. There is nothing to indicate that Stewart's discovery was coincident with an unusual outbreak. It was the first time in America that a plant pathologist had studied in a region where sweet corn was cultivated intensively as a market garden crop. It has probably been present on Long Island ever since, though varying in severity from year to year. In fact, Smith said, in 1914, that the disease was common every year on Long Island.

Halsted found it in New Jersey in 1899. On the other hand, Clinton, who came to the Connecticut Agricultural Experiment Station in 1902, hunted for the disease unsuccessfully in the large market garden sections about New Haven for a number of years following his arrival. As will appear later, this negative evidence seems of special interest and importance, and it would be desirable if equally well-supported negative evidence were available regarding a number of other diseases.

Scattered reports throughout the years from 1908 to 1932 indicate the presence of the disease more or less generally in the Southern and Central States. The material studied by Miss McCulloch from 1914 to 1918 came chiefly from Maryland, Virginia, and the District of Columbia, with one isolation each from Indiana, Pennsylvania, and New Jersey (unpublished information). Rand and Cash saw the disease and isolated the causal organism in the District of Columbia, Georgia, Illinois, Indiana, Kentucky, Maryland, New Jersey, New York, Ohio, Virginia, West Virginia, South Carolina, and Tennessee. They reported having seen it in Missouri, Iowa, Pennsylvania, and Connecticut. On the other hand, diligent search by them during the years 1921 to 1924 failed to reveal even a single case of the disease in North Dakota, Minnesota, Wisconsin, Michigan, New York (northern portion), Vermont, New Hampshire, and Maine, except for a few affected Golden Bantam plants near Albany, New York.

## Winter Temperatures

Returning now to the question of the relation of weather conditions to disease incidence: As a simple means of gaining a rough comparison of weather conditions in different years and regions, there have been prepared by the writer "seasonal indices" - simple summations of mean temperature and total rainfall for the four seasons, as used by the United States Weather Bureau. From these tabulations an interesting and perhaps signifi-

cant correlation appears between winter temperatures and the abundance of the disease during the succeeding summer. Without going into detail, it may be said that as yet no obvious relation appears between the incidence of the disease and the total rainfall during any season, nor between the incidence of the disease and the temperature during spring, summer, or fall, although one may well exist.

The New Haven, Connecticut, temperature indices for the winter months (Sum of the mean temperatures of December, January, and February) are given in Table 8. In the early years of the century when it is known that the disease was not present, the winter index was 90 or below. In 1932 and 1933, on the other hand, when the disease was severe, the winter index was well above 100 and for several preceding years had been well over 90. The disease was noted on a few plants at Mount Carmel, Connecticut, in 1931.

Table 8. Temperature indices (sums of monthly means) at New Haven, Connecticut, for the winters preceding the years indicated.

| Year | Index | Year | Index | Year | Index | Year | Index |
|---|---|---|---|---|---|---|---|
| 1901 | 85 | 1910 | 90 | 1919 | 103 | 1927 | 89 |
| 1902 | 86 | 1911 | 66 | 1920 | 75 | 1928 | 97 |
| 1903 | 90 | 1912 | 86 | 1921 | 98 | 1929 | 98 |
| 1904 | 71 | 1913 | 104 | 1922 | 89 | 1930 | 97 |
| 1905 | 73 | 1914 | 91 | 1923 | 81 | 1931 | 94 |
| 1906 | 99 | 1915 | 97 | 1924 | 97 | 1932 | 111 |
| 1907 | 79 | 1916 | 91 | 1925 | 94 | 1933 | 105 |
| 1908 | 92 | 1917 | 89 | 1926 | 91 | 1934 | 78 |
| 1909 | 98 | 1918 | 70 | | | | |

Accepting as a working hypothesis the idea that this disease will usually be absent in the northeastern United States following a winter with an index below 90 and present in destructive amounts following a winter with an index above 100, with intermediate conditions following winters between 90 and 100, it is interesting to examine a map of the eastern United States in which the normal winter indices of certain stations have been indicated (Fig. 2). The map shows normal winter temperature indices above 100 in southern Illinois, Indiana, and Ohio (Cairo, Evansville, and Cincinnati), and in Baltimore, Maryland, Washington, District of Columbia, and Charlottesville, Virginia, and at various localities farther south. It might then be expected, if the hypothesis is valid, that the disease would be so common in these regions over a period of years that susceptible varieties of sweet corn would not enter into commercial production - and such is the case.

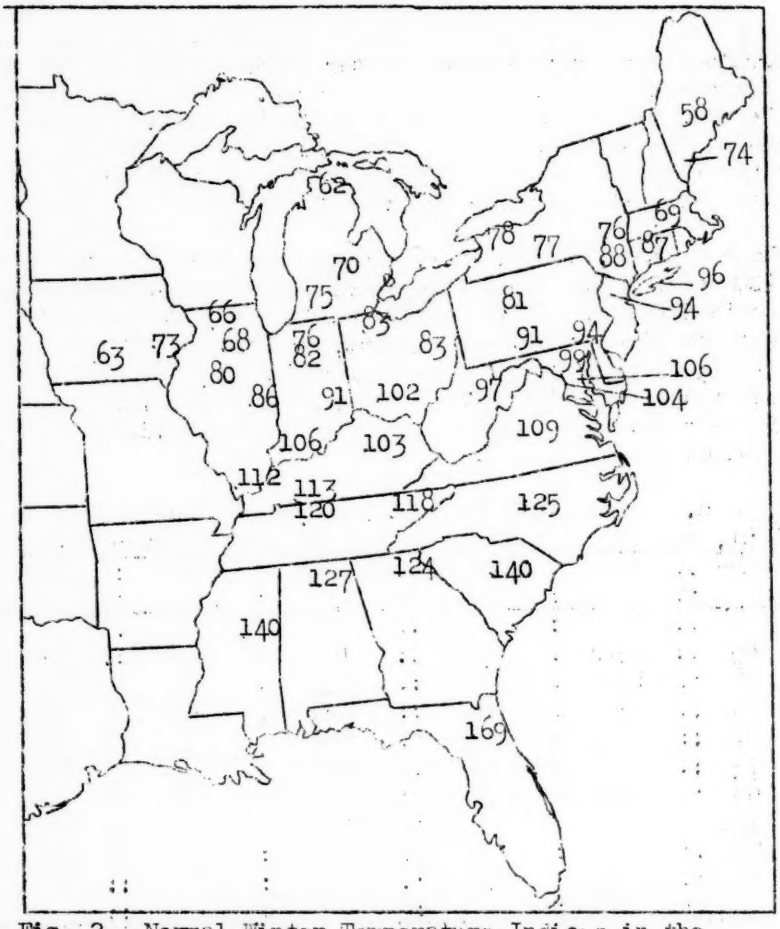


**Fig. 2.** Normal Winter Temperature Indices in the Eastern United States.

The northern portions of Illinois, Indiana, Ohio, Pennsylvania, and New York, as well as all of Michigan and of New England north of Connecticut, have normal winter temperature indices of close to 80 or well below 80; and, if the hypothesis is valid, it might be expected that the disease would be so rare in this region that very susceptible varieties of corn, if otherwise desirable, might well be in regular commercial production - this is again the case.

Between these two is a zone including Long Island, much of New Jersey and southern Pennsylvania, and the higher parts of Maryland, where the winter temperature index is intermediate and should permit the survival of the disease with occasional severe losses and other periods of only slight loss. This, again, agrees with the facts.

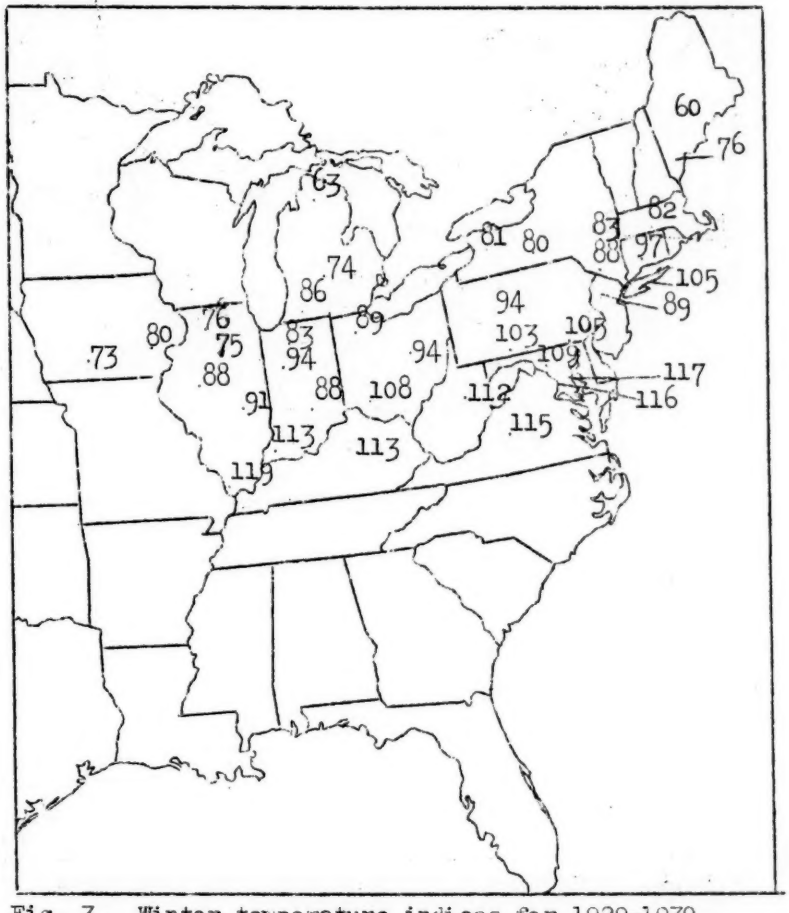


Fig. 3. Winter temperature indices for 1929-1930.

As a further test of the validity of the hypothesis, comparison may be made of maps showing the winter indices for the period from 1930 to 1934 (Figs. 3-7). By 1930 (Fig. 3) the winter index was rising generally and was above 90 in central Illinois, Indiana, Ohio, Pennsylvania, and southern Connecticut - a condition which might cause some increase in the amount of disease if present but which probably would not permit it to become destructive. The index for 1930 was well above 100 at Frederick, Maryland.

In 1931 (Fig. 4) the winter temperature index rose well above the 1930 level in central Illinois and in Indiana but was depressed somewhat in the East. If it is assumed that the incidence of the disease depends directly on the winter temperature, the disease should have been fairly severe in Illinois and Indiana; not severe, if even present, in southern Connecticut; and should have caused no commercial losses in New York north of Long Island. This again agrees with the observed facts.

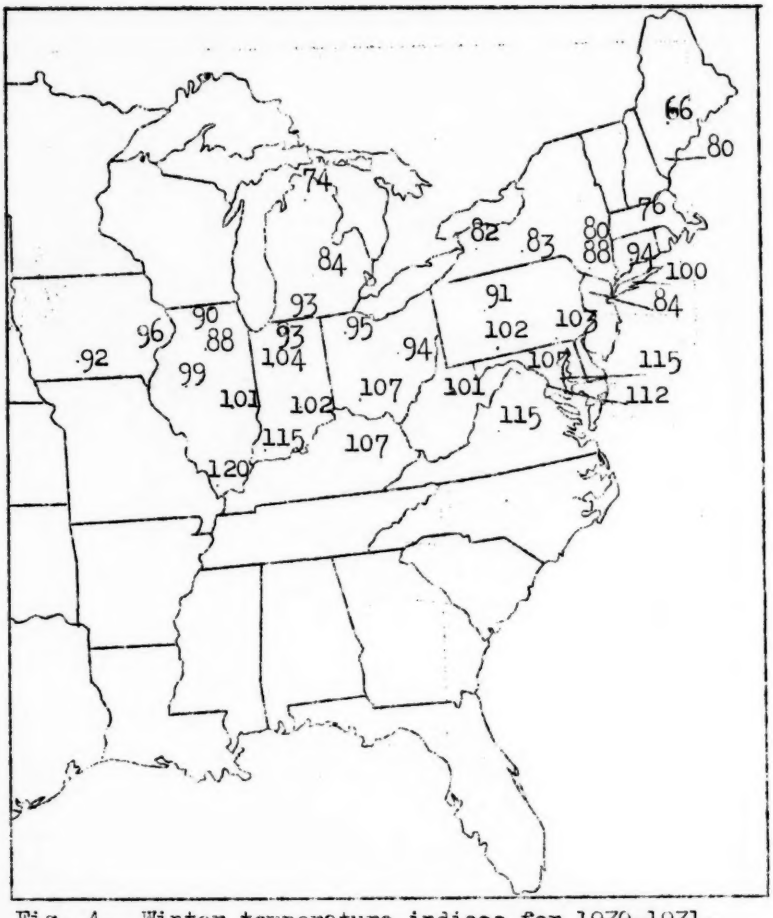


Fig. 4. Winter temperature indices for 1930-1931.

The winter temperature index preceding the season of 1932 was well above 100 (Fig. 5); in fact, it was often above 110 in northern Indiana and Ohio, northcentral Illinois and Pennsylvania, and in southern Michigan, central New York, and southern Connecticut, while a winter index above 90 was found in central Massachusetts, central Michigan, and up to the Catskill Mountains in New York. This was followed, as is well known, by the destructive outbreak of the disease recorded in detail in earlier numbers of the Plant Disease Reporter.

In 1933 the winter index (Fig. 6), while still very high, fell somewhat below that of 1932 for many of the stations here considered. In Portland, Maine, however, it was actually higher than in 1932. At this point it may well be noted that, while bacterial wilt continued unchecked in the region it occupied in 1933 and was very abundant in northern Illinois and Indiana, it did not cause as large losses in this region as the early spring infection led observers to expect; also, that this was the year and the only year in which the disease was found in southern Maine and in New Hampshire.

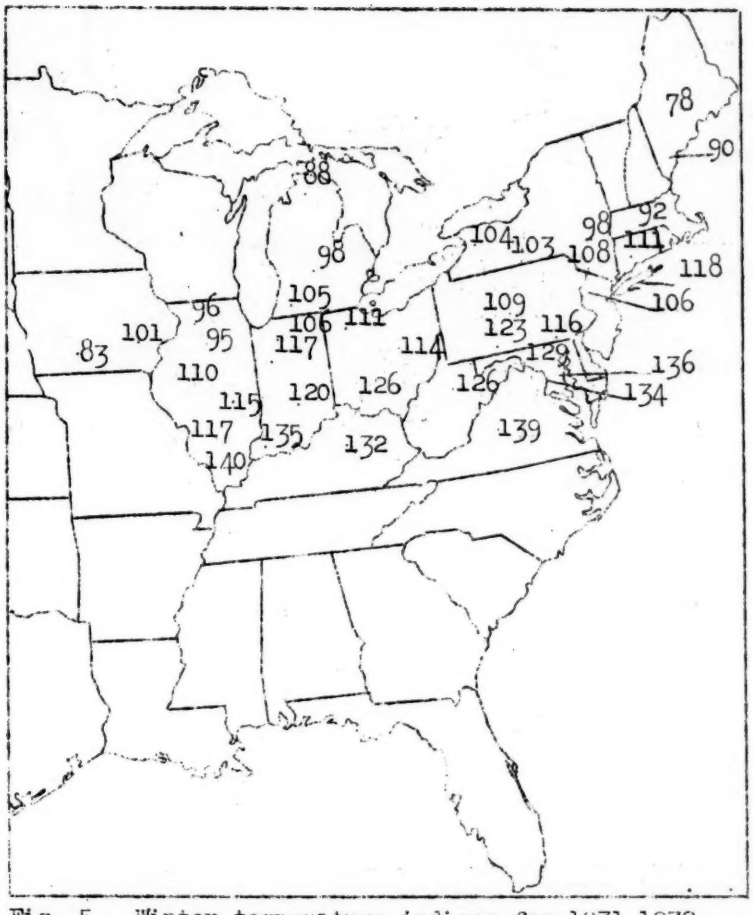


Fig. 5. Winter temperature indices for 1931-1932.

The map of temperature indices (Fig. 7) for the winter preceding 1934 shows striking contrast to the years just previous. Indices east of Ohio fell to well below normal, while those in northern Illinois, Indiana, and Ohio fell nearly to 80. On the basis of this map alone, an observer with any faith in this hypothesis would say that commercial losses should be confined to the regions near the Ohio and Potomac rivers and farther south. The disease might be present but not serious in central Illinois, Indiana, and southern Pennsylvania, while, as a cause of commercial losses, it would again be absent from Michigan, northern New York, and New England. Such was indeed the fact.

It is extremely unlikely that so simple an explanation can be wholly adequate to account for the variation in the amount of the disease. Very likely a succession of warm winters is more serious than one very warm winter. There may also be conditions under which the disease will not appear on the host even if the causal organism is present. But the relation here discussed is striking and may well be significant. Certain fragments of historical evidence still further bear out this idea.

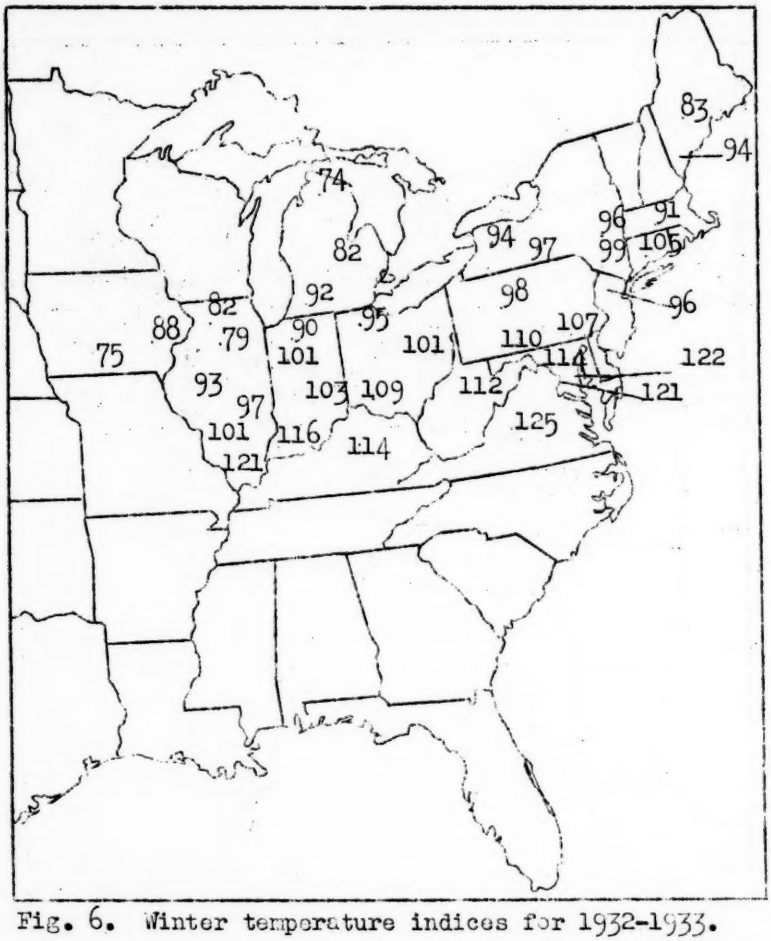


Fig. 6. Winter temperature indices for 1932-1933.

For example, Clinton, going back over his manuscript notes, in the light of his recent experience with bacterial wilt, is convinced that the disease caused serious loss near New Haven in 1919. The winter temperature index (Table 8) preceding that season was 103 in contrast to 91, 89, and 70 for the 3 preceding years and 75 for the following year.

A. G. Johnson found bacterial wilt very severe in 1922 at Westminister, Maryland, (unpublished information), where for the past several years the very susceptible Golden Bantam had been profitably grown. Both 1921 and 1922 had winter indices well above 100, as, indeed, did 1919 at Frederick, but 1917, 1918, and 1920 were unusually cold. This relatively cold period might well have permitted the development of commercial Golden Bantam production, which was terminated by the long series of warmer winters and succeeding wilt infestations that began in 1921. It might be added that bacterial wilt is not now a problem in Maryland because susceptible varieties of corn have been eliminated from commercial production.

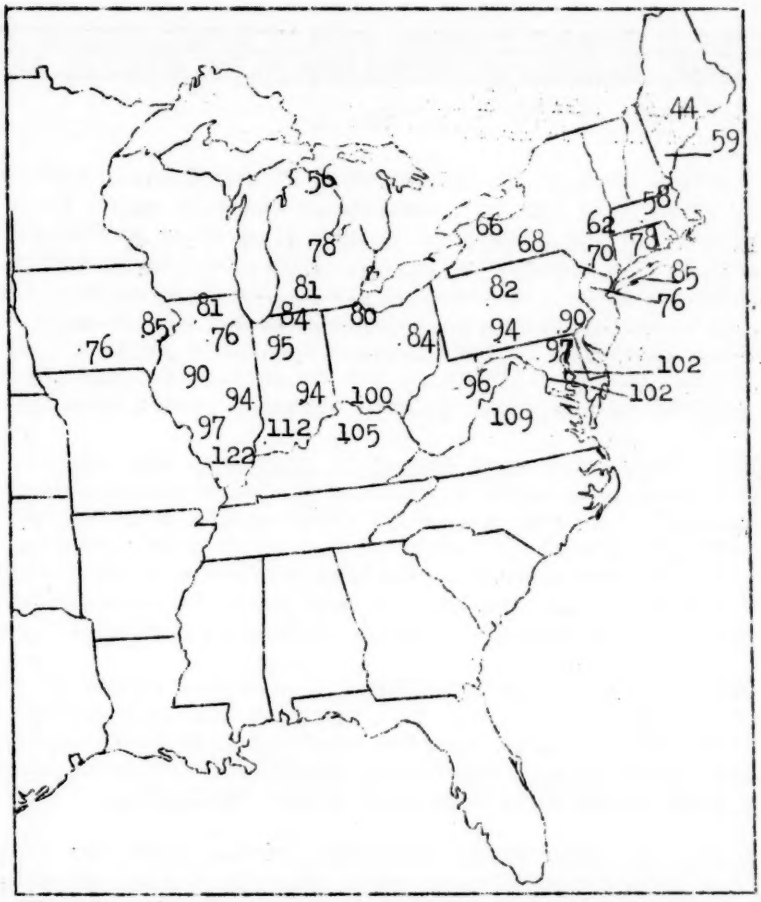


Fig. 7. Winter temperature indices for 1933-1934.

## Forecasting Future Outbreaks

It is obviously of practical importance as well as of real scientific interest to test the possibility of forecasting future outbreaks of the disease. If the relation between winter temperatures and disease incidence is actually constant, a simple computation of winter temperatures made in early spring might well serve as a working basis for forecasting the spread and severity of the disease during the following season. Such forecasts, supported by whatever further information could be secured, might well prove a useful guide in planting.

# OBSERVATIONS ON DISEASES OF CEREAL CROPS IN CERTAIN PARTS OF LOUISIANA, TEXAS, OKLAHOMA, AND KANSAS MADE IN THE SPRING OF 1934

C. O. Johnston

The severe drought in the Southern Plains States during the winter and spring of 1933-34 led to considerable interest among plant pathologists and agronomists in the subsequent amount of disease in cereal crops. The observations herein reported were made during visits to agricultural experiment stations in several States and are incident to cooperative experiments on cereal diseases under way at those stations. The remarks apply largely to conditions obtaining in the experiment station plots and fields and to farmers' fields in the vicinity of the stations. In some cases, however, the same conditions are known to have obtained over a considerable area.

WHEAT. Black stem rust (Puccinia graminis) was very heavy on certain varieties in nursery sowings of winter wheat at College Station, Texas. Rainfall was above normal in early spring and infection appeared early but did not spread uniformly to all wheat until late in the season. Stem rust usually overwinters at College Station and the fact of its occurrence there, as well as that of leaf rust, is interesting because of the absence of commercial wheat fields within many miles of that station.

At Denton in north central Texas, a moderate amount of stem rust was observed on winter wheat on May 31. The rust was just getting a good start and most varieties of wheat were too near maturity to be seriously injured. The soft red winter types, especially Texas Mediterranean selections, were definitely more susceptible than hard-seeded varieties.

At Lawton in southwestern Oklahoma, winter wheat was tall and vigorous on May 29 and only traces of stem rust could be found. At Stillwater in northcentral Oklahoma, winter wheat was in excellent condition on June 1, but only traces of stem rust could be found. At the Woodward Station in western Oklahoma drought conditions prevailed, winter wheat was very short and poor, and no stem rust appeared.

In southcentral Kansas an area of several counties received sufficient rain during the spring to produce a normal wheat crop. Stem rust appeared in traces late in the season, but hot dry weather prevented any serious increase. Farther north, in the vicinity of Manhattan, no stem rust could be found until the first week in June, after which it was promptly eradicated by extremely hot dry weather. Only traces were noted. In the western half of Kansas, drought conditions were so severe that stem rust infection could not have taken place. No infection was reported for that part of the State and only traces were noted for eastern Kansas, except in occasional lowland fields.

Leaf rust (Puccinia triticina) infection was extremely heavy in experimental sowings of winter wheat at College Station and Denton, Texas. At the latter station, some of the hard wheats were so heavily rusted that

they scarcely headed. The hard red winter wheats in general were much more heavily infected than the soft red winters. The leaves of some varieties were killed by rust infection and dried up two weeks earlier than normal.

At Lawton and Stillwater, Oklahoma, leaf rust infection was extremely heavy on the winter wheats and no doubt reduced the yield of some of the hard-seeded varieties by causing premature death of the leaves. In western Oklahoma drought conditions prevented heavy leaf rust infection and only traces could be found in the vicinity of Woodward on May 28.

Leaf rust was very abundant on winter wheat in a few counties in southcentral Kansas, but infection was very light in the northern part of the State. Infection appeared in fair abundance at Manhattan after good rains early in May but was rapidly reduced by hot dry weather in late May and early June. In the western half of the State, leaf rust was practically absent due to drought.

The highest field resistance to leaf rust was shown by Texas Mediterranean selections, Kawvale, Quivira, and selections from Kanred X Hard Federation crosses. The hard wheats exhibited the greatest susceptibility at all points where leaf rust was abundant.

Loose smut (Ustilago tritici) infection continues to be heavy in Denton and other Mediterranean-type soft red winter wheats grown in north-central Texas. Infections as high as 35 per cent have been seen in farmers' fields in the vicinity of Denton.

Only small amounts of loose smut were seen in commercial and experimental sowings of winter wheat in eastern Oklahoma and none was noted in western Oklahoma.

In Kansas loose smut seems to be increasing in the northeastern fourth of the State but is found only in traces elsewhere. Several Turkey selections from Nebraska have shown considerable loose smut in nursery sowings at Manhattan.

Stinking smut or bunt (Tilletia spp.). The writer obtained no information on the prevalence and distribution of stinking smut in Texas and Oklahoma in 1934. In Kansas the extremely droughty conditions prevalent in the western part of the State reduced the number of fields of wheat harvested and probably resulted in a decrease in the amount of bunt in that part of the State. Reports from some localities in the eastern half of the State indicate that bunt probably increased in that section in 1934.

OATS. Stem rust was severe on oats in experimental sowings at Baton Rouge, Louisiana and College Station, Texas. At both of these stations strains of oats showing strong resistance to crown rust were heavily infected with stem rust. At Denton, Texas, and Stillwater, Oklahoma, stem rust infection was light. In western Oklahoma and most

of Kansas only occasional traces of stem rust were seen on oats. In the vicinity of Manhattan, Kansas, stem rust did not appear until the second week in June and it was quickly dried up by hot dry weather shortly thereafter.

Crown rust (Puccinia coronata) infection was extremely heavy in experimental sowings (winter) of oats at Baton Rouge, Louisiana. Some varieties, such as Markton, were killed by crown rust at about heading time. Many Red Rustproof strains also were severely injured. Victoria, Bond, Alber, and Berger showed promising resistance.

At College Station, Texas, also, crown rust infection was very heavy. Some plants and nearly all of the leaves of most varieties were killed by crown rust. Alber, Bond, and Victoria showed promising resistance. Farther north in Texas only a light to moderate infection of crown rust had developed by May 31.

In the vicinity of Stillwater, Oklahoma, crown rust infection was very light on June 1 and oats were already beginning to dry up due to hot, dry weather. At Woodward, in western Oklahoma, no crown rust could be found.

A small amount of crown rust was reported from south central Kansas but only traces appeared on oats at Manhattan. Conditions were very unfavorable for oats in much of Kansas in 1934 and the crop was thin and very poor. No crown rust was reported from the western part of the State.

Loose smut (Ustilago avenae) continues to be prevalent on oats in Texas, Oklahoma, and Kansas. Most of the smut is the form which attacks Fulghum very heavily. This form of smut apparently had its origin in the winter-sown oats of the south. With the discovery and rapid adoption of the Fulghum type of oats, this form of smut increased and rapidly moved northward, until it is now coextensive with the distribution of Fulghum. In 1934 occasional fields sown with untreated seed had as much as 25 per cent smut. Covered smut (U. levis) is occasionally found in Kansas and was observed on a few hybrid selections at Stillwater, Oklahoma, but most of the oat smut of this area is loose smut.

BARLEY. Two interesting observations on diseases of barley were made in 1934. A very heavy infection of leaf rust (Puccinia anomala) occurred on winter barley at Stillwater, Oklahoma. By June 1 it was becoming severe on certain spring varieties, especially Trebi.

Considerable winter barley was grown in southcentral Kansas in 1934 and many of the fields were heavily infected with covered smut (Ustilago hordei). Seed samples are now being received that are very dark in color due to clinging covered smut spores. Spring barley which is extensively grown in the northwestern part of the State usually has more loose smut (U. nuda) than covered smut.

## "LOW SMUT" OF WHEAT

H. A. Rodenhiser

For the past few years the so-called "low smut" of wheat, caused by Tilletia tritici, has been found prevalent in the Cache Valley, Utah, and for the past two years has also been collected in a few fields of Turkey type wheats in the Gallatin Valley, Montana. Although both the smooth and rough spored species of covered smut of wheat may stunt infected plants the so-called "low smut" causes stunting to the extent that infected plants develop on the average of only a third the height of normal plants. Apparently this organism is a distinct physiologic form of T. tritici, it is known to be particularly pathogenic on Turkey type wheats, the smut balls are almost round, the spores are very coarsely reticulate and under laboratory conditions only very low percentages of spore germination have been obtained. Reports of collections of this smut would be appreciated.

## TOBACCO WILT CAUSED BY VERTICILLIUM ALBO-ATRUM

C. D. Sherbakoff

On September 14, 1934, the writer found, in a tobacco field about six miles west of Knoxville, Tennessee, one tobacco leaf about two feet above the ground conspicuously yellow and hanging limp on an otherwise healthy plant of the Burley variety. Six small pieces of inside tissues containing fibro-vascular bundles, taken out under aseptic conditions were planted on potato agar, in a Petri dish. Every planting gave a pure culture of Verticillium albo-atrum. It is assumed, therefore, that the wilt of the leaf was caused by this fungus. In this case no conspicuous discoloration of the fibro-vascular bundles was observed, probably because of the sparseness of the fungus growth.

An examination of the literature at hand shows only one previous report of the occurrence of V. albo-atrum on tobacco, from Brazil, by Averna-Sacca. However, according to Rudolph (B. A., Verticillium hadromycosis, Hilgardia 5; P. 311. 1931) "the disease in no way resembles a hadromycosis" and "from the descriptions.....it is rather doubtful whether the fungus isolated by Averna-Sacca is Verticillium albo-atrum.... until more work is done with the disease in several plants mentioned above, they should not be accepted unreservedly as hosts" of the fungus. Rudolph, in the paper cited, also states that "no other writers reported this disease in tobacco, banana, chayote, tapioca plant, or kidney bean."

It seems, therefore, that the case reported here of wilt of tobacco, Nicotiana tabacum, caused by Verticillium albo-atrum, is the first authenticated instance of the disease. The culture of the fungus is available for distribution to those who are especially interested in it.

# TOBACCO DISEASES FOR 1934 IN GEORGIA, SOUTH CAROLINA, NORTH CAROLINA, VIRGINIA, MARYLAND, AND PENNSYLVANIA

by

G. M. Armstrong, W. S. Beach, E. E. Clayton, J. G. Gaines, R. G. Henderson, J. W. Heuberger, and R. F. Poole

Root-knot (Heterodera marioni) was general in eastern North Carolina, South Carolina, and Georgia. Considerable progress has been made toward controlling the disease in Georgia, as the result of rotation experiments conducted at the Coastal Plains Experiment Station, Tifton. Suitable root-knot controlling rotations have not yet been developed for the other areas, however, and damage this year was very severe in eastern North Carolina and South Carolina. In hundreds of fields the disease caused premature ripening especially of the upper leaves. Later they cured out a very poor quality. It is estimated that the loss from reduced quality alone amounted to more than $5,000,000. In addition there was, of course, the usual reduction in growth and yield. In the South Carolina Belt, growers are reported to be generally abandoning tobacco production on the Norfolk types of soil because of continued severe root-knot losses. It is not possible to produce high quality cigarette tobacco except on a limited number of soil types and the Norfolk is one of the best of these.

Granville Wilt (Bacterium solanacearum) was very destructive in Granville, Wake, and Durham counties in the Piedmont region of North Carolina, and also caused some damage in Virginia. At present about half of the Granville types of soil are wilt-infested, and this is the best soil type for tobacco in the Old Belt. The continued heavy disease losses in the affected areas has greatly reduced the value of the farms. Land of the Granville type free from wilt rents for $50.00 an acre, if diseased it rents for around $15.00 an acre, and about 40,000 acres of diseased land are planted to tobacco each year. This disease is also severe on the Durham type of soil. The Cecil soil in this region does not suffer from wilt, but will not produce high quality tobacco. Here again the disease factor tends to encourage growers to plant tobacco on poorly adapted soil, which can only result in decreasing quality with disastrous ultimate effects.

Wild fire (Bacterium tabacum) continued very prevalent in Maryland and Pennsylvania. The disease occurred very generally in the plant beds this year. In Maryland it failed to develop in the fields except for scattered lesions. In Pennsylvania the disease developed in most fields and caused a loss of $500,000 (15 per cent of the crop), as well as alarming the growers, and leading them in many cases to cut their tobacco while it was quite green. The severity of the attack was nothing this year as compared to 1933 when, following a heavy August storm, many fields were completely destroyed by wild fire, and much of the tobacco harvested was practically worthless. Nicotiana rustica, a species reported previously as practically immune, was very badly damaged by wild fire at one location near Lancaster, Pennsylvania.

Black root rot (Thielavia basicola) was present in about the usual amount in Virginia and the Piedmont area of North Carolina.

Black-shank (Phytophthora nicotianae) showed some spread in the infected area near Winston-Salem, North Carolina.

Stem-rot (Sclerotium rolfsii) was common in the tobacco fields of eastern North Carolina and South Carolina, and appears to be increasing in amount.

Mildew or blue mold (Peronospora sp.) occurred generally in the plant beds throughout Georgia, South Carolina, North Carolina, Virginia, and Maryland. The attack was exceptionally mild and damage caused was slight.

Angular leaf spot or blackfire (Bacterium angulatum) occurred as a scattering infection in North Carolina but caused only slight damage. In Virginia, some growers in Charlotte, Halifax, Amherst, and Nelson counties suffered heavy losses.

Frog eye (Cercospora nicotianae) was quite general on the upper leaves in South Carolina and North Carolina and in many instances was so severe as to lower quality. The attack was usually associated with overmature or prematurely ripened leaf.

Mosaic (virus) was plentiful in eastern North Carolina, Virginia, and Maryland.

Drought spot was much less prevalent than usual due to plentiful rain.

## OBSERVATIONS ON FILBERT DISEASES IN WASHINGTON AND OREGON

P. W. Miller

Outbreaks of bacterial blight were found in a number of filbert orchards visited in Lewis County, Washington, during the past week. The disease was present in trees five to ten years of age as well as in younger trees. In the older trees the disease had caused death of buds and young twigs in the tops of the trees instead of a destruction of the tissues of the trunks, as is more often the case in young teees from one to four years of age. In Lewis County, Washington, the disease seemed to be worse on the DuChilly than on the Barcelona or other varieties of filberts. It was further noted that bacterial blight was more prevalent on those trees which had been previously weakened from some adverse condition such as winter injury or drought.

Bacterial blight was also found, during the course of this trip, on Corylus colurna (the Turkish filbert). Leaves, buds, and twigs of current growth of this species were infected. In a few instances small cankers were present on one-year-old branches (of 1933 growth) at the

base of blighted twigs of current growth. In most cases, though, the disease was confined to the current season's growth. No cankers were found on this species of Corylus on the trunks or larger branches. It would appear from these observations that the current growth of C. colurna is susceptible to the bacterial blight disease. While the previous year's growth may be infected by bacterial blight the extent of the spread of the disease in one-year-old branches is seemingly quite limited. Larger branches and trunks of the Turkish filbert are apparently highly resistant to this disease. The high degree of resistance apparently possessed by older branches of this species of Corylus was further shown by observations made near Silver Creek, Washington, in a Barcelona filbert orchard grafted on Turkish rootstocks. In this orchard there are several trees which had died from girdling by filbert blight cankers. The cankers were located on the filbert trunks just above the union of the Turkish rootstocks and the filbert scions. The cankers were sharply delimited at the graft union, the Turkish rootstock being unaffected. It would seem from these observations that the use of Corylus colurna as a stock for the cultivated filbert may possibly serve to lessen tree losses due to bacterial blight. The use of this species as a rootstock for the cultivated filbert cannot be unreservedly recommended, however, until it has been definitely proved to be perfectly compatible and suitable in all other respects.

Mildew, due to Phyllactinia coryli, was found during the week at Oregon City, Oregon, on the under-surface of leaves of the native wild hazel (Corylus californica). Leaves of the cultivated filbert (Brixnut variety) growing in the vicinity of these infected wild hazel bushes also infected with the same fungus. The disease is not causing any particular damage, however, due probably to the lateness of the attack.

Approximately 7 per cent of the filbert trees in the same Brixnut planting have died from damages inflicted to the tissues of trunks by the unseasonably cold temperatures which occurred in December, 1932. Comparatively few of the low-headed trees in this orchard, however, were injured during the winter of 1932. While the explanation for the lack of injury to these low-headed filbert trees is not definitely known, it is suspected that heading the trees low may have assisted materially in the prevention of sunscald. Tissues which have been injured by the hot rays of the sun are believed to be more susceptible to winter injury. (Sept. 8).

## SCAB ON THE SCHLEY PECAN IN GEORGIA

Pecan scab (Cladosporium effusum) is injurious to Schley pecans in this region for the first time since I have been working here, which is a period of eight seasons. Heretofore, a Schley nut with scab infection has been rare but this year the disease is widespread and injurious on this variety. I have inspected orchards in three counties, Lamar, Upson, and Monroe. In an orchard at Strouds Crossroads the loss from poor filling will be at least 10 per cent. I do not believe there was much dropping of nuts caused. At Milner about 25 per cent of the nuts

are infected but no appreciable damage will occur. As far as I know no control has been attempted in this region.

Delmas is also badly scabbed this year - in some years Delmas makes a crop. I also find Mobile slightly scabbed. (Theo. L. Bissell, Sept. 26).

## CRYPTOSPORIUM CANKER OF ROSE

Anna E. Jenkins

Cryptosporium minimum Laubert has recently been identified on rose stem cankers from two different sources as follows: Rosa sp., Hood River, Oregon, J. R. Kienholz, June 12, 1933, and Rosa sp. var. Billy Boilem, Harrisburg, Pennsylvania, J. M. R. Adams, June 28, 1933. A part of each specimen was sent to Dr. Laubert, who verified the identifications. This is apparently the first record of the fungus in this country. It was described from Germany by Laubert (Cryptosporium minimum nov. spec. und Frostbeschädigung an Rosen. Centbl. Bakt. II Abt., 19: 163-168, 1907) as a weak parasite producing infection following frost injury or entering the cane through wounds, although it was also associated with cankers showing no evidence of mechanical injury. The fungus was found attacking roses in England in 1925, 1926, and 1927 (Report on the occurrence of fungus, bacterial and allied diseases of crops in England and Wales for the years 1925, 1926, and 1927. Gt. Brit. Min. of Agr. and Fisheries Misc. Publ. 70, p. 62, 1929) and subsequently in both England and Wales, 1928-32. (Gt. Brit. Min. Agr. and Fisheries Bul. 79, p. 83, 1934). Artificial inoculations on raspberry in 1929 gave a small degree of infection. (Ann. Rept. East Malling Res. Sta. Gt. Brit. 1929, p. 69, 1929). Laubert states that the cankers are scattered irregularly over the canes and that they measure from 1/4 to 1 1/2 cm. in diameter, although they become larger by confluence. They are black at first surrounded by an indefinite purple border. The white spore masses of the fungus contrast with the dark color of the canker. Older cankers are lighter colored. On stems injured by frost Laubert describes the cankers as of a yellowish gray brown color dotted by dark punctate areas from which emerge the white spore masses of the Cryptosporium.

The specimens from Hood River, Oregon, were from old stems on plants believed to have been weakened the previous winter by the unusually cold temperatures for that region. Other cankers were present, notably those caused by Coryneum microstictum Berk. and Br.

## VARIOUS REPORTS ON PLANT DISEASES

APPLE BITTER ROT (Glomerella cingulata) IN TENNESSEE: Bitter rot has been very severe in eastern Tennessee this year. In some cases 50 per cent infection was found on Golden Delicious. I find very little bitter rot in western Tennessee. (Paul R. Miller, Sept. 19).

CLADOSPORIUM SPOT (C. pisicolum) ON GARDEN PEAS IN OREGON: Recent collections of pea diseases in Astoria pea section show a small amount of the Cladosporium leaf spot recently described from California. It can readily be distinguished by the production of large cankers on the pods. At present it is of very little economic importance here in Oregon. (Frank P. McWhorter, Sept.).

CURLY TOP OF SUGAR BEET: Curly top (virus) has caused heavy loss in sugar-beet fields in western Colorado, most of Utah, and southern Idaho, according to reports quoted in the News Letter of the Bureau of Entomology and Plant Quarantine (Vol. 1, no. 2, p. 14-15; Sept. 1). In eastern Idaho and in Montana damage was local and less severe and good yields were expected.

## BLISTER RUST FOUND ON PINE IN NEW JERSEY

"Blister rust (Cronartium ribicola) has been found for the first time on eight native pines in Sussex County, New Jersey," according to the News Letter of the Bureau of Entomology and Plant Quarantine. (Vol. 1, no. 2, p. 10, Sept. 1).

## OVERWINTERING OF APLANOBACTER STEWARTI

In a brief article under this title in Science (80:289-291. Sept. 28, 1934), Charlotte Elliott and F. W. Poos report the results of studies on insect transmission of the organism causing bacterial wilt of corn. They have found that the fleabeetle, Chaetocnema pulicaria Melsh., can transmit the disease from infected to healthy corn plants. They have also found that overwintered adults of the insect harbor Aplanobacter stewarti in an infective condition. The fleabeetles commonly feed on young corn plants after emerging from hibernation. The authors conclude:

"It has been known for a considerable time that Aplanobacter stewarti may overwinter in infected seed to a limited extent, but there is no direct evidence of overwintering in naturally infested soil in the field. Since A. stewarti has been found to overwinter in a common flea-beetle under natural conditions, and since infection in healthy corn plants has resulted from the feeding injuries of these beetles, it appears probable that Chaetocnema pulicaria, and possibly other insects, may be largely responsible for overwintering as well as dissemination of bacterial wilt of corn."